DECLARATION OF JAMES G. SULLIVAN

Re: Application No. 10/786,981

Inventor and Applicant: James G. Sullivan

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Group Art Unit: 3632

Examiner: Amy Jo Sterling

Title: Improved Emergency Vehicle Support Kit

I, James G. Sullivan, a natural individual residing and doing business at 10013 Norwood, Rosemont, Illinois 60018, U.S.A., am competent to make this declaration. The statements made herein are true and based upon personal knowledge, and the statements made upon information and belief are believed to be true.

1. In 1978 I attended the Fire Science Program at Oakton Community College in Morton Grove, Illinois. There I became certified as a State of Illinois emergency medical technician for ambulances (EMT-A) by the Illinois Department of Public Health.

2. In 1979 I attended the Loyola Medical Center Paramedic Program where I became a certified paramedic by the Illinois Department of Public Health.

3. In 1981 I obtained a position with the Rosemont Department of Public Safety in Rosemont, Illinois, as a public safety officer (i.e., both police officer and firefighter). I also became the training officer for the fire suppression division of the Department of Public Safety in Rosemont.

4. In 1982 I attended the Arlington Heights Fire Academy in Arlington Heights, Illinois where I was certified by the Illinois Office of the State Fire Marshall as a Firefighter-II.

5. In 1986 I became an instructor in the Technical Rescue Program of the Arlington Heights Fire Academy. I soon taught a class which specialized in OSHA regulation for trench rescue work, and which I have continued for the past fourteen years.

6. In 1991 I formed an Illinois distributorship for manufacturers of trench shoring products, and I operated this distributorship for fourteen years. I subsequently dissolved this distributorship and incorporated Prospan Manufacturing, Inc. for sale of my own equipment.

7. In addition to my position as a lieutenant for the Rosemont Department of Public Safety and an instructor with the Arlington Heights Fire Academy, in 2002 I became an

instructor of OSHA Excavation Standard 29 CFR 1926.650 through Start Group. Start Group is a company retained by municipal and private sector entities such as insurance companies for instruction of excavation procedures. Through Start Group I have instructed over one hundred municipalities on the OSHA Excavation standard throughout the United States.

8. I have presented the following lectures and demonstrations:

a. 2005,Wisconsin Underground Contractors Association, Milwaukee, Wisconsin

b. Chicago Damage Prevention Council, University of Chicago, Chicago, Illinois

c. Illinois Commerce Commission, Peoria, Illinois

d. Underground Focus Magazine, Manteno, Illinois (shoring and rescue demonstrations)

e. 2006, Chicagoland Construction Safety Council, Rosemont, Illinois

9. I have personally participated in three trench cave-ins, of which two were rescues and one was a body recovery. I directed the trench operations for two of these incidents in Rosemont, Illinois (1997) and Bloomingdale, Illinois.

10. I originally presented a structural design for a new emergency vehicle support kit device to a prototype designer, who then created a computer model based upon my design.

11. A second company created aluminum castings for the computer generated model while a third company produced the remaining aluminum components. Both companies produced the molds for these components.

12. I acquired remaining components, such as screws and lanyards, from other manufacturers.

13. Aluminum is the standard material for emergency vehicle kits because it is very strong yet lightweight. Aluminum components are easily modified by machining, such as by drilling apertures.

14. My new emergency vehicle support kit required either (1) a particular strength and grade of aluminum alloy; or (2) a new material.

15. I visited Michigan State Advanced Materials Engineering Services at Michigan State University to determine if there were superior alternative materials to aluminum for my device. At this time I knew the compression strength of a popular vehicle support kit, and one goal was to supersede this strength.

16. According to the Michigan State staff person, one alternative to aluminum is a fiber reinforced composite plastic. This plastic exhibits a very high crush-strength, but it would not withstand internal pressures after compressed air enters the cylinder during installation and removal. This pressure usually ranges between 150 and 300 pounds per square inch (psi). He also stated that this internal pressure problem would be very expensive to overcome through materials research and development.

17. I declined to develop a fiber reinforced plastic, although I was aware that this material is used in airplane designs. However, I still required the exact grades of aluminum for my device.

18. The company personnel who produced a portion of my aluminum components explained the strength differences between the available aluminum grades. The staff recommended 6061–T6 aluminum alloy, because it met my strength requirements.

19. Aluminum alloy 6061 exhibits a greater compression strength than aluminum alloy 6063, although 6063 has a more pleasing appearance when anodized (i.e., the aluminum is submerged in a chemical bath containing colored dye). Because aluminum alloy 6063 fails by buckling or distortion, I selected 6061 based upon its greater compression strength.

20. I also applied a process, known as T6, to aluminum alloy 6061 to further increase the crush strength. This process involves placing the heated aluminum in water after it is extruded or cast. Aluminum 356-T6 is better suited for sand casting, which is why I selected it instead of 6061-T6 for sand casting components.

21. The final model of my emergency vehicle support kit was tested at the University of Illinois. I tested the larger of the two available models in its fully extended length which registered strength of 14,200 pounds. I also tested this larger model in its partially extended (i.e., smallest piston retracted) at which its strength was 42,000 pounds.

22. Prior to designing my vehicle support kit, I studied trade magazines such as Firehouse, Fire Engineering, and Public Safety Product News. I also attended trade shows in Indianapolis, Indiana and Portland, Oregon to evaluate the current existing support devices.

23. I realized that the existing models attain a limited maximum length with either one sole piston, or physically separate add-on extensions.

24. Some existing vehicle support device models contain a square tubular design, so I designed cylindrical structures which are structurally stronger. In addition, current devices use loose pins which fall or are easily lost in grass or snow. I conceived a tethered pin which does not separate from the vehicle device during an emergency when every second counts.

25. In existing devices manual extension of pistons, or analogous components, is quite difficult. Particularly whenever the operator wears thick gloves, there is considerably difficulty in obtaining a firm grip quickly.

26. I considered using a metal lanyard attached to the bottom edge of the cylinder as the connecting mechanism between pistons. This approach would prevent components from disassembly whenever the operators carried the device in a downward tilted position. However when the pistons collapse into the most retracted position of my device, there is insufficient space into which the lanyard can coil.

27. I also realized that the alternative option of using pins, as connectors within the telescoping portion of my invention, would prevent piston expansion.

28. I realized that the only manner in which to quickly extend the length of the support device was either: physically separate extensions as prior existing devices, or extensions which telescope but are structurally part of the principle cylinder and piston mainframe. Because of the pressure and urgency, I decided that if parts could all be physically connected to each other, more persons in downed cars and collapsing buildings are saved when assembly time at the site is cut.

29. I incorporated the telescoping cylinders and pistons of my shoring devices, U.S. Pat. No. US 6,964,542 B1 and U.S. Pat. No. U.S. 6,746,183 B1, because these components were compatible with my developed base plate with respect to shape, measurements and materials strength.

30. My three-tiered piston system was inexpensively created by an adding a separate smallest piston, which mechanically attaches to the second intermediate sized piston.

31. I determined the required length of the entire cylinder and piston assembly when totally retracted so it would easily fit within an appropriate compartment on a fire truck. The assembled pistons and cylinder also required an easy fit into the typical fire vehicle compartment for storage.

32. Under my direction the foundry produced a new mold for the new piston end plug. The diameter was determined as that which would fit snugly but reversibly within the upper end of the intermediate tier piston.

33. The end plugs cannot not scrape, bind or catch within the space between the outside diameter of the smaller piston and inner diameter of the larger piston. Otherwise, the crucial manual extension, which is required within seconds, would fail. To achieve this goal the foundry staff machined the excess metal from the end plugs until they fit smoothly and without resistance within the pistons.

34. I eliminated the air channels, the rubber piston cups and the air inlet for the modified cylinder end plug from my patented shoring devices. These changes were necessary because vehicle and/or structural stabilization occurs with only manual extension. In fact, use of air pressure could result in collapse of the car or building being supported.

35. Next I developed the knurled ring which prevents inadvertent physical separation, or overt extension of, the telescoping pistons. I initially thought of two options. One was a thread on the cylinder and a corresponding thread on the knurled ring.

However, this would be very expensive to produce. The second option was epoxy glue but then the parts could not be disassembled for cleaning.

36. To structurally connect the pistons to each other in a collapsible manner, I decided to bolt a knurled ring to the cylinder and largest piston. The foundry staff machined the end plug exterior surfaces to abut the knurled ring interior.

37. I also developed an outside diameter of the end plug lip which is greater than the largest piston outer diameter. With this feature, the lip contacts the knurled ring lower surface.

38. I thought of the knurl feature for esthetic purposes and for greater frictional assistance when operators grip the device with thick gloves. Under my direction the foundry staff created the knurl with a machining process, for an easy 'hand-grab' feature.

39. Under my direction, the foundry staff created several knurl depths by machining with appropriate attachments until I was satisfied with the hand grip feature; i. e., no slipping when I wore thick gloves and extended the pistons from the cylinder.

40. Previously existing support base plates do not comprise an attachment mechanism for

(i) ratchet straps which secures the support device to

(ii) three approximately equidistantly spaced points along

(iii) the entire length of a downed vehicle or collapsing wall

41. Consequently at least two previously existing support devices are necessary to reliably support a car on its side or a collapsing wall due to

(i) instability of one centrally located device with one base plate with only

(ii) a single point of contact along the car or a wall.

42. I originally considered carabiner clips attached to the rachet straps to insert through the apertures for a three-point contact with the car or wall. However, carabiner clips are difficult to insert without interfering with a base plate's ability to be flush with the ground

43. Consequently I developed a base plate which has three separate attachment points for a rachet strap, one of which has 'claws' and attaches to the base plate anterior along a metal pin. I also thought of two opposing yet corresponding apertures into which a ratchet strap can insert as the second and third attachment sites along the base plate.

44. Each of the extending arms contains a corresponding aperture for attachment of a rachet strap. The arms are also designed to face the car or wall.

45. My base plate adapter required a more universal bottom surface. In contrast prior existing support devices include adapters with variably shaped lower surfaces which contact the upper surface of the actual base plate.

46. During an emergency, these diversely shaped prior existing adapters are lost, misplaced or mistakenly applied, thereby wasting valuable time when seconds saved mean saving lives.

47. I designed a rounded bottom surface, so my new adapter could rotate in two different directions. With this design I simultaneously eliminated the need to locate and insert different shaped adapters, based upon the unpredictable angle between the support point on the vehicle or wall.

48. The foundry staff machined the base plate round openings within the base plate so that they would not weaken the metal along the base plate borders.

49. In addition to the previous reasons I chose 356-T6 sand castings, I also appreciated that after removal from molds they only require minor machining.

Further Declarant sayeth not.

James A. Sullivan

James G. Sullivan,

Inventor and Applicant

DECLARATION

The undersigned, being hereby warned that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and that such willful false statements and the like may jeopardize the validity of this application or document or any registration resulting therefrom, declares that he is properly authorized to execute this document, and declares that all statements made on his own knowledge are true, and all statements made on information and belief are believed to be true.

James A. Sullivan

James G. Sullivan

Date:
5/7/06